Electronic Counting Mechanism with Telemetry Module

VAD s.r.o. | V.A.D Technical Engineering and Investment s.r.o.

Advanced electronic counting mechanism with integrated telemetry module, designed for **modern smart metering** applications across residential and commercial gas distribution networks.

This solution enables automatic transmission of meter readings to data server, remote control of shut-off valves, and intelligent monitoring of leaks and flow rate anomalies — all while ensuring **full compliance with European technical standards** and data protection regulations.

Main Technical Characteristics

- Alphanumeric LCD display with intuitive menu navigation

- High-quality PCB antenna optimized for GSM/NB-IoT/LTE-M networks

- UV-resistant housing for long-term outdoor installation

- Extended operating temperature range: -40 °C to +60 °C

- Proprietary low-load data transfer protocol minimizing GSM network traffic

- Dual independent power supplies: separate circuits for metrological and telemetric modules

- Ultra-low power consumption: telemetry powered by LiPo 2000 mAh (4.2 V – 3.4 V), battery life up to 5–10 years depending on configuration

- Configurable absolute pressure reference value for volume correction

- Session diversity module: time-separated transmission sessions significantly increase reliability in areas with challenging radio coverage

- Integrated shut-off valve control with remote and automatic safety triggers

Regulatory Compliance & Certifications

This product is designed and manufactured in accordance with the following **European standards and directives**:

- **EN 1359:2017** (Requirements for construction, performance, safety and production of class 1.5 diaphragm gas meters)

- **MID 2014/32/EU** (Measuring Instruments Directive)

- **RED 2014/53/EU** (Radio Equipment Directive)

- **CE Marking** (Conformity with EU health, safety and environmental protection standards)

- **RoHS 2011/65/EU** (Restriction of hazardous substances in electrical equipment)

- **GDPR 2016/679** (Data protection and privacy for user information processing)

All hardware carries CE marking and is eligible for MID certification upon request. Software architecture adheres to ISO 27001 information security management principles.

Displayed Parameters

- ✅ Measured gas volume (m³), temperature-compensated to +20 °C reference
- ✅ Instantaneous gas flow rate (m³/h), standardized to +20 °C
- ✅ Ambient and gas temperature (°C)
- ✅ Supply voltage status for metrological and telemetry batteries
- ✅ Configured absolute gas pressure reference
- ✅ Current date, time, and scheduled communication session
- ✅ Device serial number and firmware version
- ✅ Event log: alarms, interventions, tamper detection, communication status
- ✅ Data transfer progress to cloud/server platform

Shut-off Valve Management

- ✅ **Remote actuation** via secure server command by authorized system operator
- ✅ **Automatic closure** triggered by:
  - Flow rate exceeding 1.25 × Qmax
  - Unauthorized housing opening (tamper detection)
- ✅ **Leak monitoring** during valve-open state with anomaly detection algorithms

Software Ecosystem & Integration

Unified, modular software stack supports multi-tenant deployment, role-based access control, and full audit logging to meet utility-grade security requirements.

- ✅ **Unified Data Collection Platform** – scalable server architecture for thousands of endpoints
- ✅ **User Personal Account Portal** – web interface for consumers to view consumption, alerts, and settings
- ✅ **AI Analytics Module** – predictive leak detection, consumption forecasting, anomaly identification

Data Archiving & Transmission

- ✅ Cumulative gas volume, reduced to standard conditions (20 °C, 101.325 kPa)
- ✅ Hourly averaged consumption and temperature values
- ✅ Event archives: alarms, emergency situations, maintenance logs, communication history
- ✅ Encrypted transmission to V.A.D. IIoT Ecosystem or third-party billing systems via REST API / MQTT

Environmental & Operational Benefits

- ✅ CO_2 reduction: Optimized consumption monitoring helps households reduce emissions by up to 1.2 tons/year
- ✅ Cost savings: Early leak detection and usage insights can save users €160–500 annually
- ✅ Long service life: Up to 10 years battery autonomy reduces maintenance visits
- ✅ Network efficiency: Proprietary protocol reduces GSM data load by up to 70% vs. standard MQTT
- ✅ Cybersecurity: RED compliance, encrypted communications, secure boot, and OTA update signing

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